



## Fuel Flow Measurement Device

---

Karan Raval, Yash Bhandari, Harsh Patel and Abhishek Patel

EasyChair preprints are intended for rapid dissemination of research results and are integrated with the rest of EasyChair.

March 23, 2021

# Fuel Flow Measurement Device

**Raval Karan**

*Aotomobile Department*

*Laxmi Institute Of Technology, Sarigam*

Surat, India

**Bhandari Yash**

*Aotomobile Department*

*Laxmi Institute Of Technology, Sarigam*

Navsari, India

**Patel Harsh**

*Aotomobile Department*

*Laxmi Institute Of Technology, Sarigam*

Vapi, India

**Patel Abhishek**

*Aotomobile Department*

*Laxmi Institute Of Technology, Sarigam*

Valsad, India

**Abstract:** The study presented in the paper provides the design and development of a smart fluid measuring device for indicating the amount of liquid dispensed through a liquid dispenser. The design uses several hardware components such as using flow rate sensor, microcontroller (Arduino) along with connected Display. The system will help us in avoiding fuel corruption at fuel pumps by estimating the correct amount of the fluid that has been dispensed. The system includes a sensor which monitors the flow of the fuel and displays the real-time accurate result at the screen. The system allows users to access the most accurate displays which shall in return reduce corruption at fuel filling stations.

**Index Terms:** Arduino UNO, Flow Rate Sensor, 16 x 2 LCD Display, Jump Wire

## INTRODUCTION

Automobile vehicles use fuel as a basic source of energy.

Many technologies, over a period of time have been evolved for proper efficient consumption as well as for predicting and accurately concluding the fuel harnessed at each stage of its use in my system. The amount of fuel is indicated in analogy form, which does not give the exact idea of amount of fuel present in the tank. Thus, it is necessary to give exact level of fuel that may give the exact information to the driver of vehicle about the

amount of remaining fuel in the storage tank so that the driver can judge the remaining driving distance.

A fuel gauge is a device that measures the amount of fuel still in the vehicle.

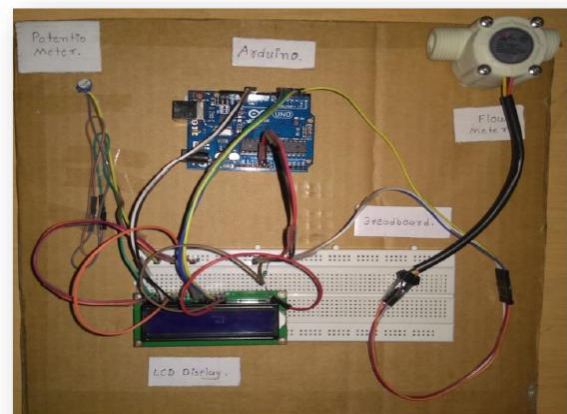


Fig. 1. System Diagram

Many of the petrol pumps today tamper pumps such that it displays the amount as entered, but in reality, the inlet of fuel filled in the consumer's tank is much lesser than the displayed value. Also the drivers of the heavy vehicles often tend to cheat their owners by not filling the fuel for the actual amount. They fill the tank for an amount which is less than the amount that the owners prescribe, so that they can save the money. The pumps and drivers are cheating for the profit that they earn. This results in great profits for the petrol pumps and drivers but at the same time the customers

are being cheated. The flow sensor is a device which calculates the current flow rate of the fluid passing through a pipe line. Flow rate might be in terms of volumetric or mass units, depending upon the end users need. After calculating the current flow rate, its shows total consumption of your process through its totalizer screen. Many types of flow meter available in global market for different need flow

## PARTS & IT'S USE

### [ 1 ]. Arduino UNO :

In the design of prototypes we use Arduino UNO. Arduino UNO is one of popular Arduino that uses ATmega328. Arduino UNO has 14 input / output digital pin (6 of which can be used as PWM outputs), 6 analog inputs, an oscillator crystal 16 MHz, a USB connection, a power jack, an ICSP header, and a reset button.

Arduino is an open source electronic platform based on easy to use hardware and software.

Arduino board are able to read input light on a sensor and turn it into an output activating what we sending a instructions to the microcontroller on the board.



Fig. 2. Arduino UNO

### [ 2 ]. 16 X 2 LCD Display :

LCD (Liquid Crystal Display) screen is an electronic display module. A 16 x 2 LCD display is basic module and is very commonly used in various circuits and devices.

LCDs are economical, easily programmable have no limitations of displaying special and even custom characters, animations and so on.

A 16 x 2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command

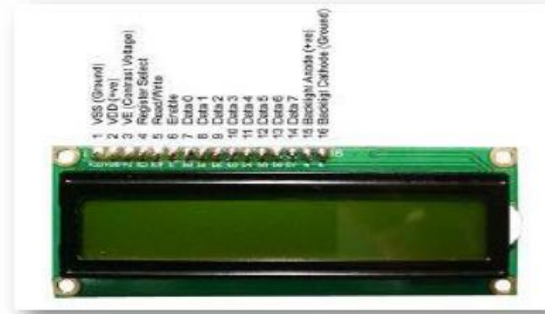


Fig. 3. 16 x 2 LCD Display

instructions given to the LCD. The data register stores the data to be displayed on the LCD.

A LCD is a flat panel display or other electronically modulated optical device that monitors use a combination of a backlight and readings controlled by an electric current, to produce images.

### [ 3 ]. Flow sensor :

Flow sensor consists of a plastic valve body, a rotor, and a hall-effect sensor.

When fuel flows through the rotor, rotor rolls. Its speed changes with different rate of flow. The hall-effect sensor outputs the corresponding pulse signal.

A flow meter is a device used to measure the flow rate or quantity of liquid moving through a pipe.



Fig. 4. Flow Sensor

This type of sensor can be found on different diameters, fuel pressure (MPa) and flow rate (L/M) ranges. In this tutorial we will use the serial

monitor for printing the fuel flow rate in liters per hour and the total of litres flowed since starting.

**[ 4 ]. Jump Wire :**

A jump wire is an electric wire, or group of them in a cable, with a connector or pin at each end, which is normally used to interconnect the components of a breadboard or other prototype or test circuit.

Internally or with other equipment or components, without soldering. Individual jump wires are fitted by inserting their ends and connectors into the slots provided in a breadboard, the header connector of a circuit board, or a piece of test equipment.

Jump wires with crocodile clips .jump wires at the end of a multi-colored ribbon cable are used to connect the pin header at the left side of blue USB2 Serial board to a white breadboard below.



Fig. 5. Jump Wire

**CONSTRUCTION**

**Connecting the Arduino to the display :**

First of all starting connection between Arduino to display. From the circuit diagram, we can observe that the RS pin of the LCD is connected to the pin 12 of the Arduino.

The LCD of R/W pin is connected to the ground, the pin 11 of the Arduino is connected to the enable signal pin of LCD module.

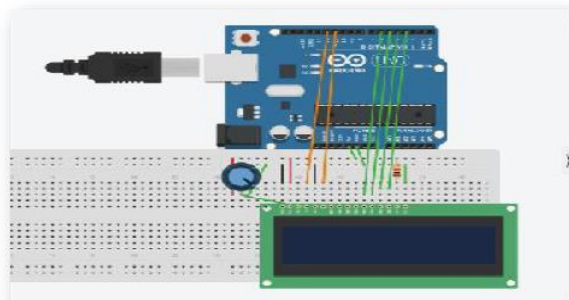


Fig. 7. Connecting the Arduino to the Display

The LCD module & Arduino module are interface with the 4-bit mode in the project. Hence there are four input lines which are DB4 to DB7 of the LCD.

It require fewer connection cables and also utilize the most potential of LCD module.

**Connecting the Arduino to the Flow Rate Sensor :**

The connections required for this flow rate sensor with respect to the Arduino are very minimal. There are only three wires coming from the flow rate sensor. The 5V VCC (Red wire), the GND (Black wire), and the signal/pulse usually yellow) line.

Connect the VCC and GND of the flow meter to the breadboard's VCC and GND. The pulse line of the flow rate sensor is connected to the Arduino's digital pin 2. The Arduino's digital pin 2 serves as an external interrupt pin (interrupt pin 0). You have hooked up your flow meter to the Arduino.

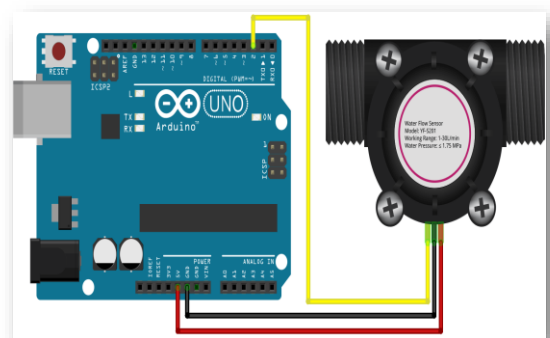


Fig. 6. Connecting the Arduino to the Flow Rate Sensor

**ADVANTAGES OF FUEL MESURMENT DEVICE**

1. Simple in design.
2. Low construction cost.
3. Easy to maintain.
4. High measuring accuracy.
5. Find out how much amount of fuel goes in the character through this device.
6. Exterminate fuel theft cases.
7. Easy to operate this device.
8. High sensitive
9. Eco – Friendly

## HOW DOES THE FLOW RATE SENSOR WORK

The Arduino flow meter works on the principle of the Hall effect.

According to the hall effect, a voltage difference is induced in a conductor transverse to the electric current and the magnetic field perpendicular to it. Here, the hall effect is utilized in the flow meter using a small fan/ propeller-shaped rotor, which is placed in the path of the flowing.

The design and the type of circuitry in the water Flow Monitor Module has been approached keeping in mind the ease of installation and a minimalistic hindrance. A micro-computer module that can communicate wirelessly with the computer can also be used instead of a USB connection.



Fig. 8. Working of Flow Rate Sensor

The sensor will output 450 pulses for a Liter of water that will pass through it, hence if 1 Liter of .water will flow through the sensor in a minute, we would be getting 450 pulses a minute. Therefore, for 1 second there will be approximately 3.75 pulses per second per Liter of water flow.

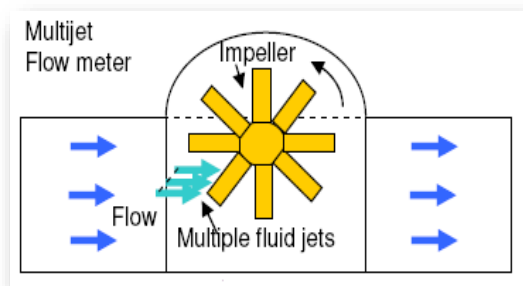


Fig. 9. Effect of Flow Rate Sensor

Hence the calibration facer is set to 3.75. the sensor is connected to the Digital pin 2 which uses an – Interrupt 01 and this is configured to trigger on a –

Falling Edgel. Since the calibration factor over here is considered for every second, there are cases in which the loop will not execute in a second.

Hence we calculate the number of milliseconds that have passed since the last execution and scale the output according to that. We also the calibration factor to scale the output based on the number of pulse that the sensor output at that second.

## CONCLUSION

Project named “Fuel Measurement Device using by flow sensor, Arduino UNO, 16 x 2 LCD Display”.

In this project we develop a system that measure the volume of fuel entering to the fuel tank of vehicle with the help of the flow sensor and Arduino.

Hence the owner can exactly know the amount of fuel filled and for what amount the same has filled. This can prevent the theft of fuel to a great extent.

Here we are placing the sensor on our fuel tank of the vehicle so that it can measure the actual volume of fuel inlet in the fuel tank.

The above discussed fact is considered in the project and it is found that a proper solution for shoeing the approximate volume of fuel entering the tank in the digital form.

Form the conducted prototype design, it can be seen that the prototype worked as expected.

## REFERENCES

1. Tigor HamonanganNasution, Muhammad Anggia Muchtar, Ikhsan Siregar, Ulfi Andayani, Esra Christian, Emerson Pascawira Sinulingga “Electrical Appliances Control Prototype By Using GSM Module And Arduino”
2. Uzval Sai Gopinadha Varma Dontiboyina and Prachi Dutta “Faucet Add-On Water Supply Management System Using Smart Sensors”
3. Tanvir Rahman, Tanzia Ahmed, Ibtiaz Hasan and Md. Ashrafal Alam “Automated House Hold Water Monitoring And Billing System”
4. Neaz Md. Morshed, G.M. Muid-Ur-Rahman, Md. Rezaul Karim and Hasan U. Zaman Department of ECE, North South University, Dhaka, Bangladesh “Microcontroller Based Home Automation System Using Bluetooth, GSM, WifiAnd DTMF”

5. <https://bit.ly/3a42TM0>
6. <https://www.jv-technoton.com/products/dfm/>
7. <https://www.youtube.com/watch?v=y841yf-WjqE>
8. <https://bc-robotics.com/tutorials/using-a-flow-sensor-with-arduino/>
9. <https://www.electroschematics.com/working-with-water-flow-sensors-arduino/>